MoTeC’s Sea-Doo RXT-X 2010 Plug-In ECU Kit is a fully programmable direct replacement for the factory ECU. No rewiring is necessary; the MoTeC M1 ECU plugs into the stock wiring harness using the original sensors and fuel system. All essential functions are maintained, including stock dash display, iBR brake and trim systems.

**11301 KIT CONTENTS**

**Hardware**

- **13130M** – M130 ECU MARINE Preloaded with the Sea-Doo RXT-X 2010 M1 Package. (A MoTeC M1 Licence is required to run this Package.)

- **61229 – SEA-DOO 2010 M130 ADAPTOR KIT** containing:
  - 61228 – SEA-DOO 2010 M130 ADAPTOR LOOM
  - 41212 – IGN4 IGNITION MODULE - 4 CHANNEL
  - 66002 – RELAY WATER PROOF

- **61230 – SEA-DOO 2010 M130 PWC MOUNTING KIT** containing:
  - Mounting Plate
  - Nylock Nuts and Stainless Steel Washers
  - Mounting Screws

**Licence**

- **23001** – M1 LICENCE - Personal Watercraft

This Licence is required to run the Sea-Doo RXT-X 2010 M1 Package in the M130 ECU.

**2016 UPDATE**

- Firmware version 01.01.0022 for M130
- Firmware version 01.00.0011 for M150
- Adaptor Loom Revision F supports 2015+ models with revised DESS power switching
- Adaptor Loom Revision E requires simple field modification to match Revision F
- Adaptor Loom Revision D and prior may not function properly on 2015+ models
- Mounting kit modified - no backing pad

**FEATURES**

- Improved RPM limiting allows for higher speed in rough water
- Programmable Launch Control to reduce cavitation
- Tuneable fuel and ignition mapping for performance
- Integrated tuneable DSP Knock Control on each cylinder
- Optional exhaust lambda input via MoTeC Lambda-to-CAN (LTC) or Professional Lambda Meter (PLM) for fuel tuning
- Level 1 data logging included in standard Package price (predefined channels at up to 10Hz for diagnostic analysis)
- Level 2 logging available as an upgrade (up to 200 configurable channels at up to 200Hz, 120MB)
- Optional inputs for additional sensors, including:
  - Exhaust Collector Temperature (EGT) via TCA Thermocouple Amplifier
Exhaust Temperatures for Cylinders 1, 2 and 3 via TCA Thermocouple Amplifiers
Fuel Temperature
Jet Nozzle Pressure
Jet Nozzle Angle
Jet Intake Pressure
Engine Oil Temperature
Engine Oil Pressure (switch is standard)
Trim Switch - allows for Fuel, Ignition or Launch adjustments
G-Force (acceleration) - Longitudinal, Lateral, Vertical

COMPATIBILITY - ADAPTOR LOOMS

The adaptor loom design has been updated several times to accommodate changes made by the OE manufacturer. Most changes relate to the DESS lanyard operation. For this reason not all models may operate correctly with all adaptor looms, as follows:

Revision B Adaptor Looms (March 2012)
- For use with external SKM Knock modules
- DESS lanyard has magnetic reed switch - ski will power up as soon as the lanyard is attached.
- Lanyard alone controls power relay.
- Required firmware version - 01.00.0001, April 2013
- Models:
  - RXT-X 260 2010
  - RXT-X iS 260 2010
  - RXP-X 2012
  - Spark

Revision C Adaptor Looms (May 2013)
- Use M1 internal DSP for knock control
- DESS lanyard has magnetic reed switch - ski will power up as soon as the lanyard is attached.
- Lanyard alone controls power relay.
- Required firmware version - 01.01.0007, October 2013
- Models:
  - RXT-X 260 2010
  - RXT-X iS 260 2010
  - RXP-X 2012
  - Spark

Revision D Adaptor Looms (October 2015)
- DESS lanyard has electronic switch - ski will not power up until the Start/Stop button has been pressed.
- Lanyard alone controls power relay.
- Required firmware version - 01.01.0007, October 2013
- Models:
  - RXT-X 260 2010
  - RXT-X iS 260 2010
  - RXP-X 2012
  - Spark
  - 2015- present

Revision E Adaptor Looms (August 2016)
- DESS lanyard has electronic switch - ski will not power up until the Start/Stop button has been pressed. Lanyard should be attached before Start/Stop button is pressed.
- ECU alone controls power relay.
- Required firmware version - 01.01.0022, October 2013
- Models:
  - RXT-X 260 2010
  - RXT-X iS 260 2010
  - RXP-X 2012
  - Spark
  - 2015- present

These looms require a simple field modification to allow for late production M130 ECUs (after serial number 1313005342).

61228 Rev E Sea-Doo 2010 Adaptor Loom M130
- Remove blanking plug from M1 connector A06.
- Move green wire from M1 connector A23 to M1 connector A06.
- Insert blanking plug into M1 connector A23.
Load M1 Package Sea-Doo RXT-X2010. October 2013 "RXTX RXPX Stock inj Stock FP 98 Octane 8350 Rev F Adaptor Update".

Check for latest version at www.motec.com
Revision F Adaptor Looms (November 2017)

- DESS lanyard has electronic switch - ski will not power up until the Start/Stop button has been pressed. Lanyard should be attached before Start Stop button is pressed.
- ECU alone controls power relay.
- Required firmware version - 01.01.0022, October 2013
- Models:
  - RXT-X 260 2010
  - RXT-X iS 260 2010
  - RXP-X 2012
  - Spark
  - 2015- present

Load M1 Package Sea-Doo RXT-X2010. October 2013 "RXTX RXPX Stock inj Stock FP 98 Octane 8350 Rev F Adaptor Update".
### DIMENSIONS

Measurements in mm.

![Dimensions Diagram]

### MOUNTING

The M130 Marine ECU replaces the factory ECU fitted on top of the engine.

**Before fitting the M130 ECU, remove the factory ECU (three T25 Torx screws).**

1. With the Mounting Plate right way up (studs pointing up), position the Mounting Plate onto the plastic manifold casting on the PWC.
2. Re-install the three OE Torx screws firmly, with Loctite 243 or equivalent.
3. Fit the M130 ECU over the 3 mounting studs and secure with 3 x 5mm stainless washers and 3 x 5mm Nylock nuts. Do not over-tighten. See following image of completed mounting.

4. To ensure correct connection, plug the stock wiring harness into the Adaptor Loom in the following order:
   a. Plug A (grey face) from the stock harness.
   b. Plug B (black face) from the stock harness.

See following image of plug A and B on the stock harness.
5. Plug the Adaptor Loom into the M130.
6. Ensure all supplied devices are connected. That is – the M130, IGN4 Ignition Module and Waterproof Relay.
7. Using zip-ties, secure devices as required.

The M130 ECU must have the relevant firmware Package loaded before the Adaptor Loom is powered up. If you have not loaded the Package you should unplug the IGN4 Ignition Module and remove all three injector/ignition fuses (numbered 7, 8, and 9) from Fuse Box 1. Only after unplugging the ignition module and removing the fuses, load the M130 Package.

### DSP Knock Control Update for Revision B Adaptor Looms

The April 2013 update provides for on-board DSP Knock Control out of the box. Earlier kits using the March 2012 (original) release can be modified to utilise this feature. If the April 2013 (or later) M130 firmware is installed on these earlier kits, the following modifications must be made to avoid possible engine damage:

1. Install the April 2013 M130 firmware and obtain a new licence (issued at no charge).
2. Replace the "Knock" connector plug (DTM2 Male) with a DTM4 pin male plug, with the grey wire inserted into the pin 2 position, as shown following.

Alternately, make a jumper cable to connect pin 2 of the "Knock" connector (DTM2 Male) to pin 2 of the "Knock SKM" connector (DTM4 Female).

Note: Lambda measurements require a MoTeC Lambda-To-CAN (LTC) device and Bosch LSU4.9 Lambda Sensor. Before installing the LTC, it MUST be pre-configured to 500kbit/sec CAN bus speed.

### M800 AND M1 ADAPTOR LOOM COMPATIBILITY

Sea-Doo RXT-X models from 2010 onward differ from the 2004-2009 models as they use Electronic Throttle Control (Drive-by-Wire) and offer brake and suspension options.

MoTeC provides Adaptor Looms with the two MoTeC PWC Kits for the M400 family of ECUs; these are not interchangeable. Likewise, the M130 Adaptor Loom is not interchangeable with either of the 2004-2009 Adaptor Looms.

### OPERATIONAL DIFFERENCES

The MoTeC Sea-Doo RXT-X 2010 plug-in ECU closely mimics the standard OEM operation, however, there are some operational differences when the MoTeC ECU is installed.

- The M130 Marine ECU engine control functionality is less complex than the standard factory ECU; only one mode is supported. The Handlebar Mode Switching does not operate as in the stock craft.
- The iBR system works in conjunction with the brake lever. M130 Marine ECU and instrument cluster to determine how the brake will operate. The interaction is complex and not user-adjustable. If for any reason the iBR unit is not satisfied with data received from the other components, the red iBR Warning Light will illuminate and the brake system will no longer operate. If this occurs, the craft must be shut down by stopping the engine, removing the Ignition Lanyard and waiting for 10 seconds before re-inserting the Ignition Lanyard and re-starting the engine.

- The M130 Marine ECU will control the Sea-Doo instrument cluster and mimic the original factory dash operation. The ECU controls the dash via CAN. The CAN transmit settings and the CAN custom data set are not user-adjustable. Also, the dash alarms are not user-adjustable – they are pre-set in the dashboard. The M130 provides relevant sensor information (for example, engine temperature) and the dashboard raises alarms as required. Hence, all dash alarms will operate identically to the stock ECU.

- The standard Sea-Doo 2010 models use an Ignition Lanyard with an immobiliser function to power up the craft. This causes a cumbersome start procedure where the Start button must be pressed before the Ignition Lanyard is inserted, then a wait for a double-beep to indicate that the PWC will start. The MoTeC Sea-Doo RXT-X 2010 plug-in ECU solution does not have the same requirement. Once the Ignition Lanyard is inserted, the Start/Stop button will work at any time; no double-beep indication is given by the dash.
• **Power Control Functions - Adaptor Looms Revision B and C**
  ○ Power is continuously applied to the ECU while the Ignition Lanyard is connected. Tuning adjustments, log downloads, and ECU configuration file downloads may all be performed without interruption.
  ○ Power is removed from the ECU only by removing the Ignition Lanyard.
  ○ There is no automated power-down function. **If no further work is required on the ECU, always remove the Ignition Lanyard immediately after stopping the engine.**

• **Power Control Functions - Adaptor Looms Revision D, E and F**
  ○ Power is only applied to the ECU when the Start/Stop button is pressed. If the Lanyard is attached, the M1 will turn on the ECU Power Relay to maintain power.
  ○ If the engine is stopped using either the Start Stop button or by removing the Lanyard, power will be maintained for 10 seconds and then the ECU Power Relay will turn off.
  ○ If the ECU is connected to M1 Tune, power will be maintained when the engine is stopped. Tuning adjustments, log downloads and ECU configuration file downloads may all be performed without interruption.

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### M1 OPERATIONAL FEATURES

#### Launch Control
This system aids initial take-off by means of ignition retard, engine speed limiting and boost aim control. It also provides fuel volume trimming to assist exhaust cooling.

Engine speed limiting during launch uses the Launch Engine Speed table and Launch Engine Speed Margin. The primary means of control is ignition retard.

While Engine Speed is above Launch Engine Speed, the Ignition Timing Limit Advance system attempts to control engine speed using closed loop control of ignition timing. If Engine Speed exceeds (Launch Engine Speed + Engine Speed Margin), a hard limit (ignition cut or/and potentially fuel cut) is applied. This allows turbocharged engines to develop boost pressure prior to launch.

The activation state of the launch system is reported by State and further information about why launch is inactive is reported by Diagnostic.
## PINOUT (ADAPTOR LOOM REVISION F) - M130 CONNECTOR A - 34 WAY

Mating Connector: Tyco Superseal 34 Position Keying 1 (MoTeC #65044)

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Designation</th>
<th>Full Name</th>
<th>OE Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A01</td>
<td>OUT_HB2</td>
<td>Half Bridge Output 2</td>
<td>AL1</td>
<td>Throttle Motor +</td>
</tr>
<tr>
<td>A02</td>
<td>SEN_5V0_A</td>
<td>Sensor 5.0V A</td>
<td>AK4, AB4, BJ3, BK1</td>
<td>5V Supply for Throttle, Throttle Lever, MAP</td>
</tr>
<tr>
<td>A03</td>
<td>IGN_LS1</td>
<td>Low Side Ignition 1</td>
<td>D03</td>
<td>Ignition Cylinder 1 Output</td>
</tr>
<tr>
<td>A04</td>
<td>IGN_LS2</td>
<td>Low Side Ignition 2</td>
<td>D02</td>
<td>Ignition Cylinder 2 Output</td>
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<tr>
<td>A05</td>
<td>IGN_LS3</td>
<td>Low Side Ignition 3</td>
<td>D01</td>
<td>Ignition Cylinder 3 Output</td>
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<tr>
<td>A06</td>
<td>IGN_LS4</td>
<td>Low Side Ignition 4</td>
<td>BH2, P02</td>
<td>Power Relay Output</td>
</tr>
<tr>
<td>A07</td>
<td>IGN_LS5</td>
<td>Low Side Ignition 5</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>A08</td>
<td>IGN_LS6</td>
<td>Low Side Ignition 6</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>A09</td>
<td>SEN_5V0_B1</td>
<td>Sensor 5.0V B</td>
<td>AC4</td>
<td>5V Supply for Trip-over Sensor</td>
</tr>
<tr>
<td>A10</td>
<td>BAT_NEG1</td>
<td>Battery Negative</td>
<td>BF2, BL1, BM2, BM3</td>
<td>Ground via 12 Way Splice Saver</td>
</tr>
<tr>
<td>A11</td>
<td>BAT_NEG2</td>
<td>Battery Negative</td>
<td>L01, P01, C05, R85, R87</td>
<td>Ground via 12 Way Splice Saver</td>
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<tr>
<td>A12</td>
<td>IGN_LS7</td>
<td>Low Side Ignition 7</td>
<td>Not Used</td>
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<tr>
<td>A13</td>
<td>IGN_LS8</td>
<td>Low Side Ignition 8</td>
<td>Optional PWM Output</td>
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<tr>
<td>A14</td>
<td>AV1</td>
<td>Analogue Voltage Input 1</td>
<td>AF3</td>
<td>Throttle Servo Position Main</td>
</tr>
<tr>
<td>A15</td>
<td>AV2</td>
<td>Analogue Voltage Input 2</td>
<td>AG4</td>
<td>Inlet Manifold Pressure</td>
</tr>
<tr>
<td>A16</td>
<td>AV3</td>
<td>Analogue Voltage Input 3</td>
<td>AK3</td>
<td>Throttle Servo Position Tracking</td>
</tr>
<tr>
<td>A17</td>
<td>AV4</td>
<td>Analogue Voltage Input 4</td>
<td>BA3</td>
<td>Throttle Lever Tracking</td>
</tr>
<tr>
<td>A18</td>
<td>OUT_HB1</td>
<td>Half Bridge Output 1</td>
<td>AL2</td>
<td>Throttle Motor</td>
</tr>
<tr>
<td>A19</td>
<td>INJ_PH1</td>
<td>Peak Hold Injector 1</td>
<td>AB3</td>
<td>Fuel Cylinder 1 Primary Output</td>
</tr>
<tr>
<td>A20</td>
<td>INJ_PH2</td>
<td>Peak Hold Injector 2</td>
<td>AK1</td>
<td>Fuel Cylinder 2 Primary Output</td>
</tr>
<tr>
<td>A21</td>
<td>INJ_PH3</td>
<td>Peak Hold Injector 3</td>
<td>AJ1</td>
<td>Fuel Cylinder 3 Primary Output</td>
</tr>
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<td>A22</td>
<td>INJ_PH4</td>
<td>Peak Hold Injector 4</td>
<td>Not Used</td>
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<tr>
<td>A23</td>
<td>INJ_LS1</td>
<td>Low Side Injector 1</td>
<td>Not Used</td>
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</tr>
<tr>
<td>A24</td>
<td>INJ_LS2</td>
<td>Low Side Injector 2</td>
<td>BL4</td>
<td>Starter Relay</td>
</tr>
<tr>
<td>A25</td>
<td>AV5</td>
<td>Analogue Voltage Input 5</td>
<td>BE1</td>
<td>Throttle Lever Main</td>
</tr>
<tr>
<td>A26</td>
<td>BAT_POS1</td>
<td>Battery Positive</td>
<td>BM4, L04, V02</td>
<td>Supply for ECU, LTC, Boost Solenoid</td>
</tr>
<tr>
<td>A27</td>
<td>INJ_PH5</td>
<td>Peak Hold Injector 5</td>
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<tr>
<td>A28</td>
<td>INJ_PH6</td>
<td>Peak Hold Injector 6</td>
<td>Not Used</td>
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<td>A29</td>
<td>INJ_PH7</td>
<td>Peak Hold Injector 7</td>
<td>Not Used</td>
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<tr>
<td>A30</td>
<td>INJ_PH8</td>
<td>Peak Hold Injector 8</td>
<td>Not Used</td>
<td>Cruise Assist Set Button</td>
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<tr>
<td>A31</td>
<td>OUT_HB3</td>
<td>Half Bridge Output 3</td>
<td>V01</td>
<td>Boost Solenoid Output (Optional)</td>
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<tr>
<td>A32</td>
<td>OUT_HB4</td>
<td>Half Bridge Output 4</td>
<td>R86</td>
<td>Fuel Pump Relay</td>
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<tr>
<td>A33</td>
<td>OUT_HB5</td>
<td>Half Bridge Output 5</td>
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<tr>
<td>A34</td>
<td>OUT_HB6</td>
<td>Half Bridge Output 6</td>
<td>Not Used</td>
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</table>
## PINOUT (ADAPTOR LOOM REVISION F) - M130 CONNECTOR B - 26 WAY

Mating Connector: Tyco Superseal 26 Position Keying 1 (MoTeC #65045)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Full Name</th>
<th>OE Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01</td>
<td>UDIG1</td>
<td>Universal Digital Input 1</td>
<td>AH1</td>
<td>Engine Speed Sensor</td>
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<tr>
<td>B02</td>
<td>UDIG2</td>
<td>Universal Digital Input 2</td>
<td>AE2</td>
<td>Engine Synchronisation Sensor</td>
</tr>
<tr>
<td>B03</td>
<td>AT1</td>
<td>Analogue Temperature Input 1</td>
<td>AH3</td>
<td>Inlet Manifold Temperature</td>
</tr>
<tr>
<td>B04</td>
<td>AT2</td>
<td>Analogue Temperature Input 2</td>
<td>AA1</td>
<td>Coolant Temperature Sensor</td>
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<tr>
<td>B05</td>
<td>AT3</td>
<td>Analogue Temperature Input 3</td>
<td>AH4</td>
<td>Muffler Temperature</td>
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<tr>
<td>B06</td>
<td>AT4</td>
<td>Analogue Temperature Input 4</td>
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<tr>
<td>B07</td>
<td>KNOCK1</td>
<td>Knock Input 1</td>
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<td>Knock Sensor</td>
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<tr>
<td>B08</td>
<td>UDIG3</td>
<td>Universal Digital Input 3</td>
<td>BE4</td>
<td>DESS Signal</td>
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<td>B09</td>
<td>UDIG4</td>
<td>Universal Digital Input 4</td>
<td>AF4</td>
<td>Tip-over Switch</td>
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<tr>
<td>B10</td>
<td>UDIG5</td>
<td>Universal Digital Input 5</td>
<td>AE3</td>
<td>Oil Pressure Low Switch</td>
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<tr>
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<td>UDIG6</td>
<td>Universal Digital Input 6</td>
<td>BH3</td>
<td>Steering Lock Switch</td>
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<td>B12</td>
<td>BAT_BAK</td>
<td>Battery Backup</td>
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<td>Engine Start Stop Button</td>
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<td>AG2,K01</td>
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<td>0V Supply</td>
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<tr>
<td>B17</td>
<td>CAN1_HI</td>
<td>CAN Bus 1 High</td>
<td>BC1, L03</td>
<td>500 kbit/sec CAN to Dash, Brake, LTC</td>
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<tr>
<td>B18</td>
<td>CAN1_LO</td>
<td>CAN Bus 1 Low</td>
<td>BC2, L02</td>
<td>500 kbit/sec CAN to Dash, Brake, LTC</td>
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<td>AV7</td>
<td>Analogue Voltage Input 7</td>
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<td>B22</td>
<td>AV8</td>
<td>Analogue Voltage Input 8</td>
<td>M02</td>
<td>Boost Pressure (Optional)</td>
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<tr>
<td>B23</td>
<td>ETH_TX+</td>
<td>Ethernet Transmit +</td>
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<td>Ethernet Green/White</td>
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<td>B24</td>
<td>ETH_TX-</td>
<td>Ethernet Transmit-</td>
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<td>Ethernet Green</td>
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<td>B25</td>
<td>ETH_RX+</td>
<td>Ethernet Receive +</td>
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<td>Ethernet Orange/White</td>
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<td>B26</td>
<td>ETH_RX-</td>
<td>Ethernet Receive-</td>
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<td>Ethernet Orange</td>
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